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ALBERTA. DEPT. OF THE ENVIRONMENT
WATER RESOURCES DIVISION.

Preliminary report on watershed protection and coal development, by D.G. Harrington.

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PRELIMINARY REPORT

ON

WATERSHED PROTECTION

AND

COAL DEVELOPMENT

Submitted to:

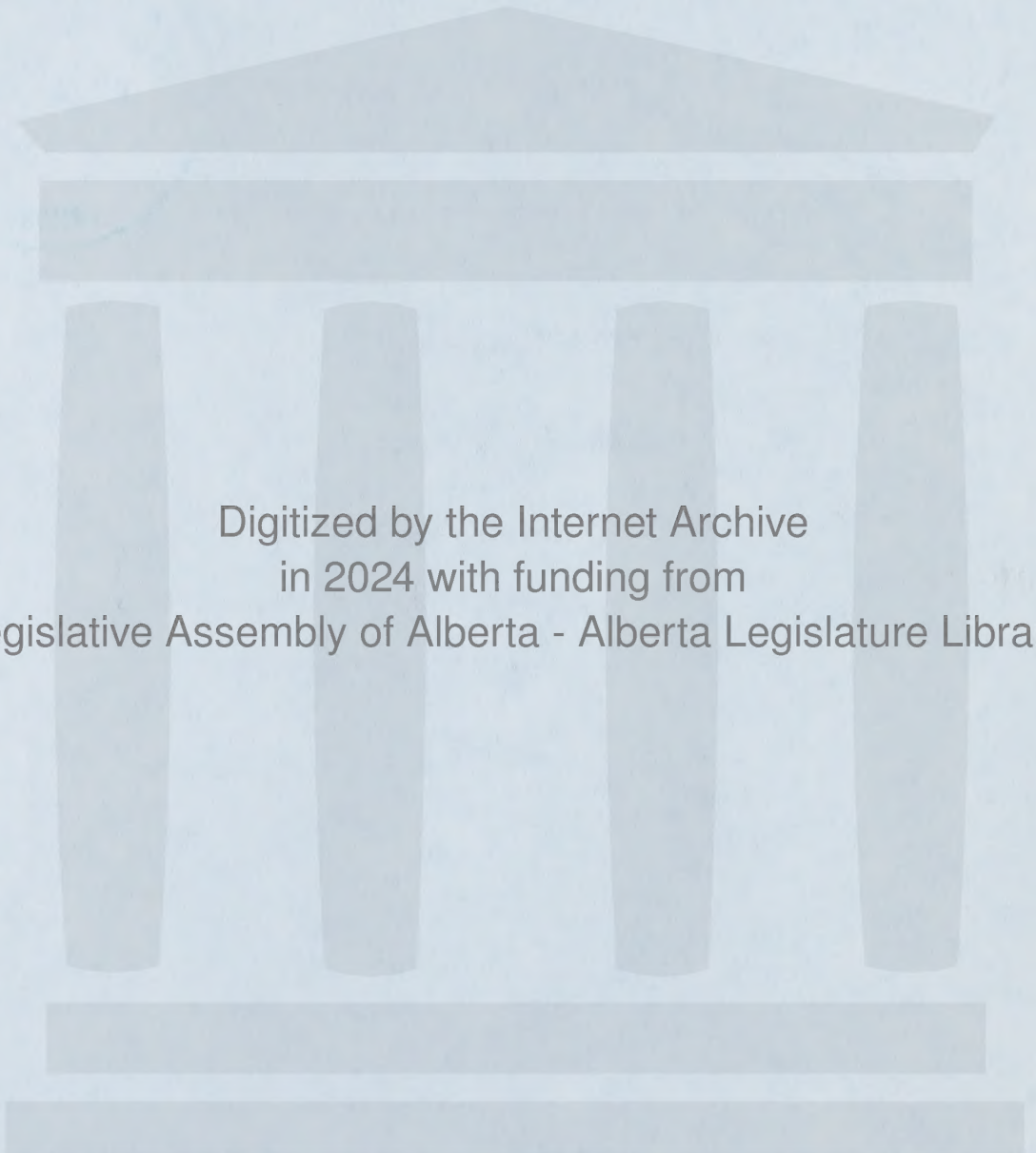
R. E. Bailey, P. Eng.
Director
Water Resources Division

Alta. Dept. of the Environment

April 26, 1971

Submitted by:

D. G. Harrington, P. Ag.
Branch Head
Land Development Branch



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ACKNOWLEDGEMENTS

This report was prepared by D. B. Patterson, under the direction of D. G. Harrington. It incorporates contributions from the various Branches of the Water Resources Division.

TABLE OF CONTENTS

INTRODUCTION

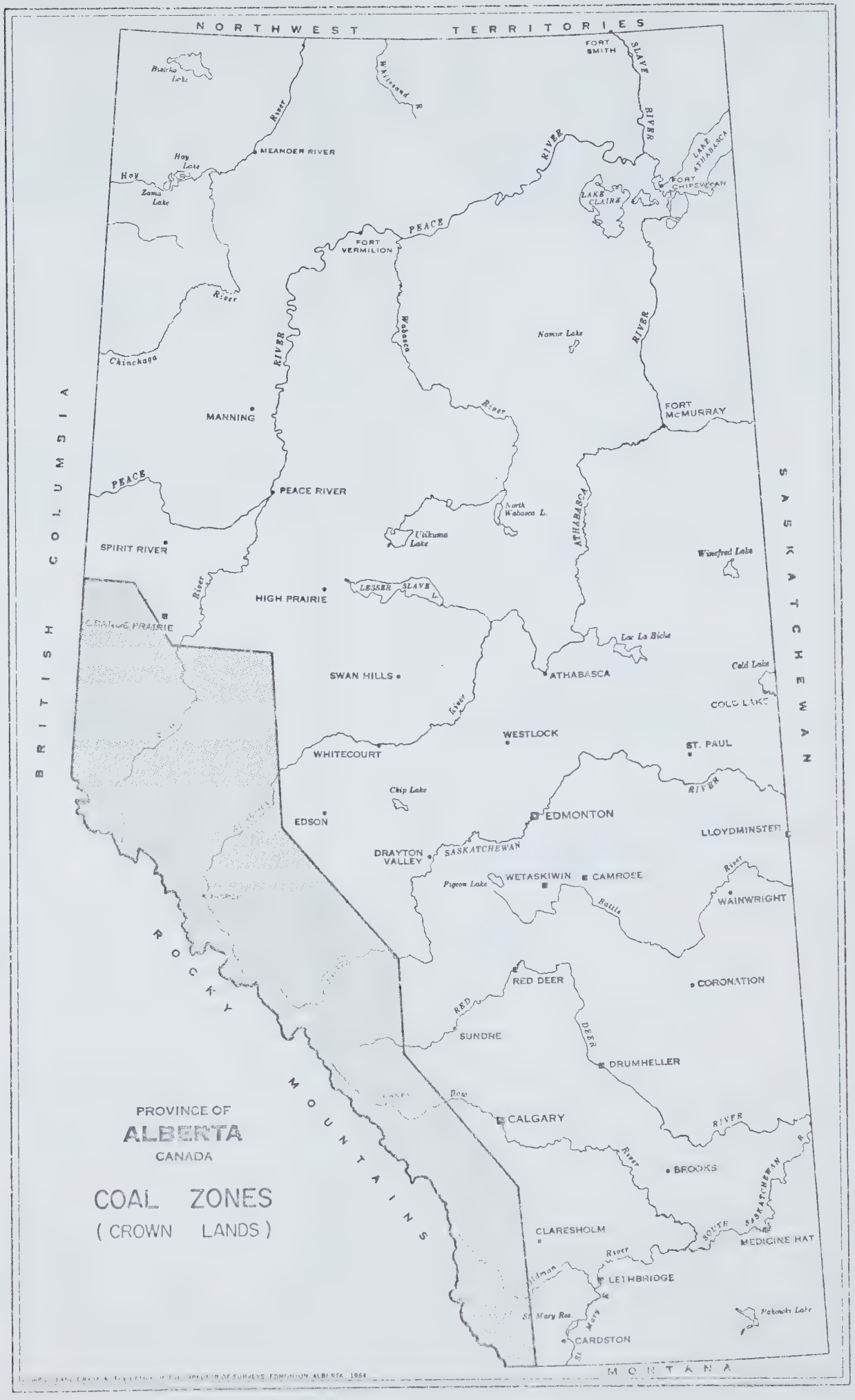
The major coal deposits in Alberta on crown lands are located in the foothills and mountain region running in a northwestern direction from the border (see map). This area is the upper part of the watershed where the major river systems of the province originate.

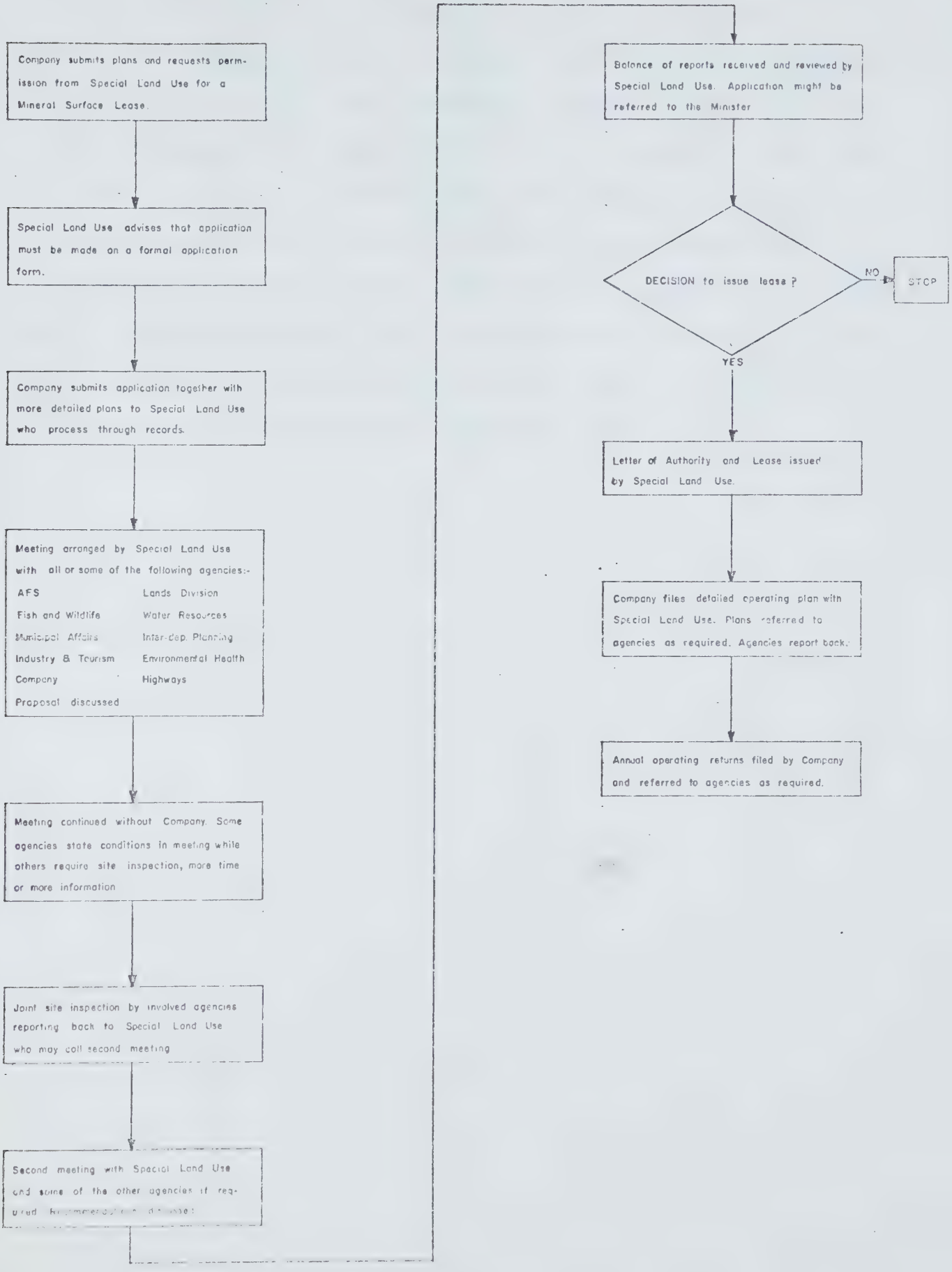
In view of the recent expansion of coal exploration and development it becomes evident that these activities must be compatible with watershed management objectives if the yield and quality of water from the region are to be maintained.

The purpose of this report is to recommend procedures that will 1) maintain the yield and quality of water and 2) establish a practical working relationship between Industry and Government for the exploration, development, and reclamation of coal mining areas.

Proper reclamation of the mining area is the top priority in all operations. The degree of this reclamation is yet to be established, but we take the position that the reclamation aspect of the operation is just as important as the development. We propose the institution of a Coal Development and Reclamation Report which would require companies to provide technical data on their reclamation procedures.

At present, applications for coal mining surface rights are processed through the Special Land Use Section of the Department of Lands and Forests. Through this Branch, other government departments receive the applications, process them and make inputs into the final terms of the letter of authority. Each agency has full opportunity to question the proposals and make recommendations it feels are necessary for the protection of the resource for which it is responsible. This procedure is shown graphically on Network Diagram No. 1.


NORTHWEST TERRITORIES
BRITISH COLUMBIA
SASKATCHEWAN
MONTANA
FORT SMITH
SLAVE RIVER
Buffalo Lake
Hay River
MEANDER RIVER
Hay Lake
Hay
Zama Lake
LAKE ATHABASCA
FORT CHIPEWYAN
LAKE CLAIRE
PEACE RIVER
FORT VERMILION
Chinchaga River
Chinchaga
MANNING
Wabasca River
Namur Lake
ATHABASCA RIVER
FORT McMURRAY
PEACE RIVER
North Wabasca L.
Utikuma Lake
SPIRIT RIVER
Winefred Lake
HIGH PRAIRIE
LESSER SLAVE L.
Lac La Biche
SWAN HILLS
ATHABASCA
Cold Lake
COLD LAKE
WESTLOCK
WHITECOURT
ST. PAUL
Chip Lake
EDSON
EDMONTON
LLOYDMINSTER
DRAYTON VALLEY
SASKATCHEWAN
Pigeon Lake
WETASKIWIN
CAMROSE
WAINWRIGHT
Battle River
ROCKY MOUNTAINS
RED DEER
CORONATION
SUNDRE
DRUMHELLER
CALGARY
BROOKS
CLARESHOLM
SOUTH SASKATCHEWAN R.
MEDICINE HAT
LETHBRIDGE
St. Mary Res.
Petaquin Lake
CARDSTON
PROVINCE OF
ALBERTA
CANADA
COAL ZONES
(CROWN LANDS)



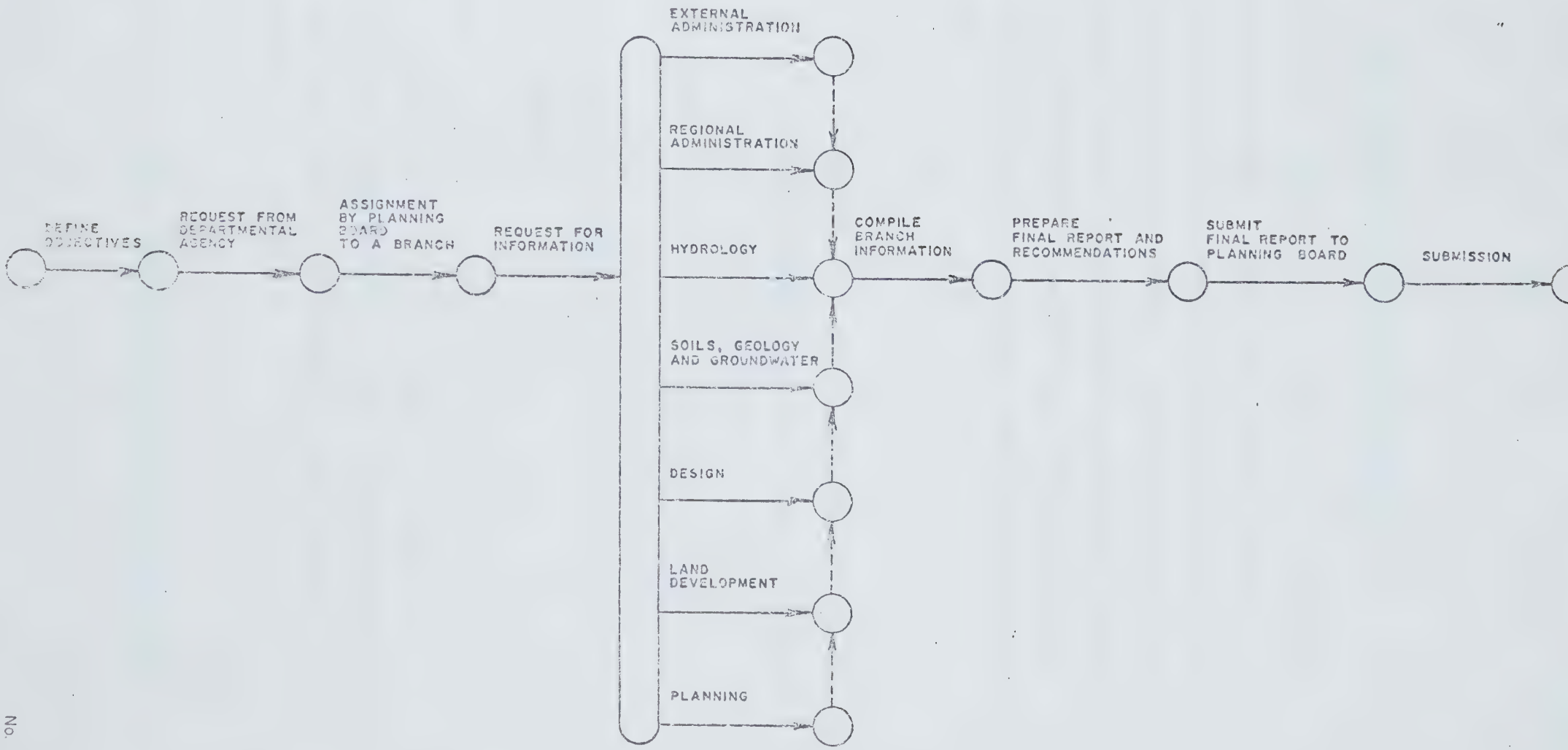
PROCESS SCHEMATIC OF HANDLING SURFACE RIGHTS APPLICATIONS

The role of the Water Resources Division in this process is to analyze the company's proposal to determine the effect on the watershed, and either approve the proposal or recommend changes that will enable the company to proceed (see Network Diagram No. 2). The problem to date has been that we have not had sufficient detailed information to properly assess each application. Because of the number and urgency of the applications the onus should be on the applicant to submit detailed information. This will mean that coal mining companies will have to use their own staff and/or retain consultants in order to submit the required information in the Development and Reclamation Report.

LAND DEVELOPMENT BRANCH

WATERSHED PROTECTION

NETWORK DIAGRAM



PREPARED: D. Herring
DRAWN: L.A.C.

No. 2

COAL DEVELOPMENT AND RECLAMATION REPORT

The following is a suggested format to be used in the preparation of the Development and Reclamation Report to be submitted with the application. It is understood that the detail of each section will vary with the type and location of the operation. The information requested is intended to serve as a guide to the consultant and is subject to his interpretation. THE COMPANY MUST ENSURE THAT EACH REPORT IS SIGNED BY A PROFESSIONAL COMPETENT IN THE FIELD IN WHICH HE HAS MADE AN INPUT INTO THE INVESTIGATIONS.

A. Introduction

A general outline should be given indicating the overall duration of the operation, required manpower needs, production rates, and estimates of the reserves being developed. Further data should contain a cost comparison of the intended type of operation against other means of development.

This is designed to illustrate the scope of the operation and justify the chosen means of development.

B. Mining Methods

Information presented will describe in detail the procedures that will be used to mine at the proposed site. It will include the sizes and weights of all hauling vehicles to be used and will describe any other means of transportation to be utilized.

C. Schedule

The stage-by-stage schedule for the operation will indicate the

timing for each stage and the sequence of activities to be followed. Reclamation operations must be included in this schedule upon completion of the first stage. The schedule will thus incorporate two concurrent operations and indicate how they are interrelated.

D. Development Operations

This section contains descriptions of the reports required before total assessment is possible. It is requested that all reports be bound together within the total Development and Reclamation Report.

1) Spoil Banks - The company will provide an engineering report giving a stability analysis for the loaded slope and spoil pile, based on the results of a foundation investigation and properties of spoil pile material.

2) Groundwater - The company will provide:

   a) a hydrogeological consultant's report on the general effect of mining on the groundwater regime, i.e., the groundwater flow system, and the chemistry and volumes of discharge under natural conditions, during mining operations, and when reclamation is complete.

   b) results of the recorded test holes of the exploration program encountering water as provided for in the Groundwater Control Act.

3) Water Control Structures - The company will provide design details and all engineering data for all water control structures, water schemes, erosion protection schemes, and bridges.

4) Industrial Effects - The company will provide details of investigations into effects the proposal may have on other commercial operations located in close proximity to the proposed site.

5) Flood Plains - Where flood plains are involved, the company will provide:

   a) a topographic plan of the site showing flood levels at various frequencies.

   b) comments by a competent river engineer on:

      i) the probability of channel shifting in the flood plain.

      ii) the danger (or safety) from ice jam flooding.

   c) information on pollutants that could reach the river, stream, or lake if the site were flooded.

6) River Regime - The company will provide an engineering report:

   a) detailing the expected effects of the operation on the natural channel pattern of the area, with regard to possible detrimental increases in sediment processes.

   b) giving a comprehensive review of measures to be established to reduce sedimentation to the lowest possible level.

7) Water Quality - The company will provide:

   a) a report on the monitoring system for water quality and sedimentation showing locations and methods.

   b) a list of all precautions deemed necessary for the following concerns:

      i) prevention of erosion.

      ii) prevention of debris accumulation.

      iii) prevention of deleterious material from escaping into surface and/or subsurface water.

      iv) insuring proper waste disposal.

      v) insuring minimum disturbance at stream crossings.

E. Reclamation Operations

The reclamation program must be outlined giving details of the schedule to be followed, the methods to be used, and intentions behind any special structuring.

1) Excavations - If the company should decide to create any artificial lakes or open pits, it will provide for the excavated areas a long term stability analysis of the high wall slope based on the results of a foundation investigation.

2) Soils - The company will provide:

   a) results of tests of soils to be used for beds in water systems.

   b) results of tests of soils to be used to establish vegetation.

   c) types of vegetation to be used and the means of establishment.

3) Plans - The company will provide:

   a) plates illustrating completed reclamation for each stage which show all details.

   b) an artist's illustration showing the final features after total reclamation.

F. Appendix

Here will be listed the names of people who can be contacted with respect to any part of the report. Included will be their business addresses and telephone numbers.

G. Map Section

This section will contain the maps and plates required to more clearly illustrate parts of the proposal.

1) Location Maps - on NTS (1:50,000) map indicating location of plants, areas of development, lease boundaries, haul roads, and campsites.

2) Topographic Map -

a) on scale 1 inch : 600 feet (contours 25 feet)

b) to show details of development, location of debris heaps, spoil piles, overburden storage areas, haul roads, residences, workshops, boundaries, pits, and plants.

3) Aerial Photograph Mosaic -

a) scale 1 inch : 600 feet (contours 50 feet)

b) to show major areas of concern and developments to be established.

4) Drainage -

a) all permanent and intermittent water systems will be shown, including flood plains, where required.

b) further plates, as are necessary, showing any intended diversion schemes, damsites, channel containment schemes, or artificial water routes, and indicating areas to be affected.

5) Excavation Plates -

a) the stage-by-stage operation.

b) all depths, distances, and lengths for each stage.

c) cross-section details of operations.

d) water structures.

e) cross-sections of the terrain.

f) material volumes, where necessary.

RECOMMENDATIONS

After investigating the coal mining problem we find that certain aspects of the industry require further consideration and directives. Each concern will be given in the form of a recommendation followed by an explanation.

1) COMPANIES WILL BE REQUIRED TO POST RECLAMATION BONDS - These bonds should be on a per acre basis and set in accordance with estimated actual costs. Most United States state governments have moved in this direction and find that rates of up to $500 per acre are necessary. The costs in Alberta will be even higher, especially in the foothills. Although most companies are signed to long term commitments it is evident that the Japanese market for coal may be changed especially now that the Japanese people have declared war on air pollution. New technical process discoveries also make this market an uncertain one.

2) NO APPLICATIONS SHOULD BE CONSIDERED UNTIL A TOTAL REPORT IS PRESENTED - In the past company-government action has been a back and forth fill-in-the-blanks process. We hope to correct this problem through the presentation of the proposed Development and Reclamation Report. When this has been established it will facilitate the assessment of the proposal and a faster issuance of an adequately regulated lease authority.

3) DEVELOPMENT OPERATIONS SHOULD BE STAGED - All operations will be carried out in a short run stage pattern with reclamation required to start immediately upon completion of each stage. In the Report we

require a detailed timetable for the operation which schedules concurrently the development and reclamation phases of the operation. No maximum limits should be set for all operations but each should be looked at individually and in relation to the overall situation.

4) STRIP MINING OPERATIONS ON PATENTED LANDS SHOULD BE SUBJECT TO THE SAME POLICY AS THOSE ON CROWN LANDS - This recommendation appears at first to infringe on the rights of the individual to work as he sees fit. We feel this is necessary because of certain developments which have come to light recently in which strip mines have been established that are major threats to waterways. The lack of restrictions and government controls could result in sedimentation problems in systems already under pressure.

5) COMPANIES SHOULD BE EXPECTED TO SUBMIT APPLICATIONS THREE MONTHS IN ADVANCE - We fully endorse the attempts of the Special Land Use Supervisor to establish this time period. In the past it has been the practice of companies to apply one week, hoping to start two weeks later. The Right of Entry Act has helped to create this situation. The three month period is required to allow the departments to review the proposal fully and make field checks. If further information is required then it can be requested and received within this period.

6) COMPANIES SHOULD PROVIDE ANNUAL CONSULTANTS' REPORTS - This report will show operations progress and details of environmental protection related to water quality and river sedimentation. Along with this will be submitted a 1 inch - 600 feet mosaic air photo of the area outlining the specific areas dealt with in the report. This is necessary because certain operators have changed operation procedures without notifying the proper government branches.